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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,842	07/02/2003	Makoto Motoyoshi	09792909-5654	6387
26263	7590	01/13/2005	EXAMINER	
SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, SEARS TOWER CHICAGO, IL 60606-1080			TRAN, MAI HUONG C	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 01/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/612,842

Applicant(s)

MOTOYOSHI ET AL.

Examiner

Mai-Huong Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 6-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### **Election/Restriction**

Applicant's election of Group I (Claims 1-5) is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Applicants have the right to file a divisional application covering the subject matter of the non-elected claims.

### **Drawings**

The drawings are objected to for the following reasons.

Reference sign 44 is not included in figure 1 (see 37 CFR § 1.84p). Correction is required.

Applicant is required to submit a proposed drawing correction, showing changes in red ink, in response to this Office action. However, formal correction of the noted defect(s) can be deferred until the application is allowed by the examiner (see MPEP § 608.02v).

### **Claim Rejections - 35 U.S.C. § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 are rejected under 35 U.S.C. 103 (a) as being unpatentable over  
Background of the Invention in view of U.S. Patent No. 6,724,651 to Hirai.

Regarding to claim 1, a magnetic memory device having a non-volatile magnetic section including a first interconnection; a second interconnection crossing first interconnection in a grade-separated manner (page2, [0015]); and a tunnel magneto resistance element 13 electrically insulated from first interconnection and electrically connected to second interconnection, the tunnel magneto resistance element 13 including a tunnel barrier layer 133 interposed between ferromagnetic materials 132, 134 within a region in which first and second interconnections cross wherein non-volatile magnetic section stores information by utilizing a change in resistance depending on whether spin

directions of ferromagnetic materials are parallel or antiparallel (page2, [0015], and fig. 30);

Background of the Invention does not disclose the non-volatile magnetic section comprising a through hole for connecting tunnel magneto resistance element with an interconnection layer lower than first interconnection, through hole passing through first interconnection while being insulated from first interconnection; and a contact formed in through hole for interconnecting interconnection layer lower than first interconnection and a side of tunnel magneto resistance element which is opposite to a side which second interconnection is connected to. However, Hirai teaches the non-volatile magnetic section comprising a through hole for connecting tunnel magneto resistance element with an interconnection layer lower than first interconnection, through hole passing through first interconnection while being insulated from first interconnection; and a contact formed in through hole for interconnecting interconnection layer lower than first interconnection and a side of tunnel magneto resistance element which is opposite to a side which second interconnection is connected to (col. 9, lines 64-67, col. 10, lines 1-9, col. 11, lines 23-38, and fig. 22).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the non-volatile magnetic section comprising a through hole for connecting tunnel magneto resistance element with an interconnection layer lower than first interconnection, through hole passing through first interconnection while being insulated from first interconnection; and a contact formed in through hole for interconnecting interconnection layer lower than first interconnection and a side of tunnel magneto resistance element which is opposite to a side which second interconnection is connected to, as taught by Hirai in order to decrease the weight, size and power consumption of a memory (col. 2, lines 17-20).

Regarding to claim 2, Hirai discloses the magnetic memory device wherein first interconnection comprises a plurality of interconnections, and contact connects the side of tunnel magneto resistance element which is opposite to the side to which second interconnection is connected and another interconnection layer through through hole passing through first interconnection while being insulated from first interconnection (col. 9, lines 64-67, col. 10, lines 1-9, col. 11, lines 23-38, and fig. 22).

Claims 3-5 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Background of the Invention in view of U.S. Patent No. 6,724,651 to Hirai and further in view of Durlam et al. (6,211,090).

Regarding to claim 3, Background of the Invention in view of Hirai discloses the claimed invention except for the magnetic memory device wherein first interconnection includes a flux concentrator comprising a high permeability film provided at least on both sides of first interconnection and on an surface which is opposite to the side that faces tunnel magneto resistance element; at least one of high permeability films on the side face of first interconnection projects from first interconnection toward tunnel magneto resistance element; and through hole extends through first interconnection and flux concentrator while being insulated from both first interconnection and flux concentrator. Durlam et al. teach a method of fabricating a flux concentrator for use in magnetic memory devices (cols. 3-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a flux concentrator, as taught by Durlam et al. in order to form high density, nonvolatile magnetic memories and more particularly to improved methods of fabricating magnetoresistive random access memory magnetic field programming lines that include an integrated flux concentrating

layer for providing shielding and reducing bit switching current (col. 1, lines 7-13).

Regarding to claim 4, Background of the Invention in view of Hirai discloses the claimed invention except for the magnetic memory device further comprising a flux concentrator including a high permeability film provided between first interconnection and tunnel magneto resistance element, and on the side face of tunnel magneto resistance element via an insulator film and through hole extends through first interconnection and flux concentrator while being insulated from both first interconnection and flux concentrator. Durlam et al. teach a method of fabricating a flux concentrator for use in magnetic memory devices (cols. 3-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a flux concentrator, as taught by Durlam et al. in order to form high density, nonvolatile magnetic memories and more particularly to improved methods of fabricating magnetoresistive random access memory magnetic field programming lines that include an integrated flux concentrating layer for providing shielding and reducing bit switching current (col. 1, lines 7-13).



Regarding to claim 5, Background of the Invention in view of Hirai discloses the claimed invention except for the magnetic memory device further comprising a first flux concentrator including a high permeability film provided at least on both sides of first interconnection, and on an surface which is opposite to the side that faces tunnel magneto resistance element; a second flux concentrator including a high permeability film provided between first interconnection and tunnel magneto resistance element, and on the side face of tunnel magneto resistance element via an insulator film; and through hole extends through first interconnection and first and second flux concentrators while being insulated from first interconnection and first and second flux concentrators. Durlam et al. teach a method of fabricating a flux concentrator for use in magnetic memory devices (cols. 3-6).


It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a flux concentrator, as taught by Durlam et al. in order to form high density, nonvolatile magnetic memories and more particularly to improved methods of fabricating magnetoresistive random access memory magnetic field programming lines that include an integrated flux concentrating layer for providing shielding and reducing bit switching current (col. 1, lines 7-13).

### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mai-Huong Tran whose telephone number is (571)272-1796. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571)272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Mai-Huong Tran  
Examiner  
Art Unit 2818